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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,424	10/18/2005	Masashi Tamura	1163-0536PUS1	1484

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EXAMINER	
NEWMAN, MICHAEL A	
ART UNIT	**PAPER NUMBER**
2624	

NOTIFICATION DATE	DELIVERY MODE
10/02/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/553,424	TAMURA ET AL.	
	Examiner	Art Unit	
	Michael A. Newman	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 October 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *18/Oct/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Regarding claim 2, lines 6 – 9 recite " ... carrying out weighted addition of the image signal value of the pixel of interest and the low-pass filter value using the edge intensity values before and after *the correction*." However, it is unclear as to whether *the correction step* is that in the independent claim 1 (line 15) or in line 2 of claim 2. Therefore, the claim, as recited, is indefinite. For the purpose of examination against prior art, it has been interpreted as using the image signal value of the pixel of interest before image signal value correction and the edge intensity after the edge intensity value correction step.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 3 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Cho (U.S. Patent No. 7,142,239).

a. Regarding claims 1 and 3, Cho teaches an image processing method comprising: a feature value calculation step of calculating feature values of micro regions in a specified region having a pixel of interest at a center **(Col. 17 lines 44 – 46 and Col. 18 lines 6 – 10)**, from pickup results of an image pickup device that has a color filter with a particular color at each of pixels arrayed two-dimensionally **(Col. 1 lines 17 – 19) [Note that a color filter array values are used to obtain Red (R), Green (G) and Blue (B) colors for the Bayer array]**; an edge intensity value calculation step of calculating an edge intensity value in a neighborhood of the pixel of interest from the feature values of the micro regions calculated by the feature value calculation step **(Col. 17 lines 48 – 51 and line 59 to Col. 18 line 5) [Note the example of the calculation of at least the first directional coefficient for G components given in Col. 18 lines 34 – 60]**; a filter value calculation step of calculating a low-pass filter value of the pixel of interest from the image signal values of neighboring pixels which have a same color component as the pixel of interest **(Col. 15 line 59 – 64) [Note Fig. 6 blocks 611 - 621; which effectively use the G components of neighboring pixels in Fig. 1 to obtain a low-pass signal]**; and an image signal value correction step of correcting the image signal value of the pixel of interest by using the edge intensity value calculated by the edge intensity value calculation

step and the low-pass filter value calculated by the filter value calculation step **(Col. 23 lines 47 – 60) [Note that this is essentially implemented in Fig. 6, in which the values of the directional coefficients corresponding to the edge amount and direction are used to select the low passed values. As Cho explains, equations 1 and 2 form the mathematical basis for adaptively applying the low passing based on the detected edge degree.]**

b. Regarding claim 4, Cho teaches the image processing method according to claim 1, wherein when carrying out color interpolation of an image of the pixel of interest using pixel signal values of neighboring pixels, the feature value calculation step, the edge intensity value calculation step, the filter value calculation step and the image signal value correction step carry out the correction of the image signal value of the pixel of interest **(Col. 23 lines 6 – 26) [Note that the main purpose of Cho's system is to carry out adaptive interpolation]**.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cho (U.S. Patent No. 7,142,239) in view of Mackinnon et al. (U.S. Patent No. 6,148,115). Hereinafter referred to as Cho and Mackinnon respectively.

a. Regarding claim 2, Cho teaches all the limitations of the independent claim 1 as set forth in the 102 rejection of claim 1 above. Cho further teaches an edge intensity value correction step of correcting the edge intensity value calculated in the edge intensity value calculation step **(Cho Col. 18 lines 34 – 60) [Note that the detected edge values are adjusted/corrected to several state values using a set of thresholds]**. Furthermore, Cho teaches that the image signal value correction step corrects the image signal value of the pixel of interest by carrying out weighted addition of the image signal value of the pixel of interest and the low-pass filter value using the edge intensity values before and after the correction **(Cho Col. 23 lines 20 – 27 – equation 2 and Col. 25 lines 44 – 50 – equation 7) [Note that the image signal value of the pixel of interest *before* correction is used (i.e. R_{22}), the low-pass filter result around the pixel of interest (i.e. $\frac{G_{21}+G_{23}+G_{12}+G_{32}}{4}$) and they are weighed by the correct**

edge coefficients (in this case assumed to be ½)]. However, **Cho fails to teach** that the correction of the edge intensity value is in accordance with an edge intensity correction curve. **Pertaining to the same field of endeavor, Mackinnon teaches an image enhancement system which adaptively applies smoothing by detecting edges. Specifically, Mackinnon teaches finding edge strengths and normalizing them according to a curve (Mackinnon Fig. 7) to obtain edge coefficients (Mackinnon Col. 15 lines 18 – 20). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement Cho's edge coefficient thresholding step using a piecewise linear function, as taught by Mackinnon, in order to obtain a more accurate and continuous representation of edge intensity within the prescribed ranges from the coefficients.**

8. Claims 5, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kotaki et al. (U.S. Patent No. 5,200,841) in view of Adams (U.S. Patent No. 7,023,487). Hereinafter referred to as Kotaki and Adams respectively.

a. Regarding claim 5, Kotaki teaches an image processing method comprising: a feature value calculation step of calculating feature values of micro regions in a specified region having a pixel of interest at a center, from pickup results of an image pickup device that has a color filter with a particular color at each of pixels arrayed two-dimensionally **(Kotaki Col. 1 lines 59 – 65 and Col.**

11 lines 9 - 10); a binarization step of binarizing the feature values of the micro regions calculated by the feature value calculation step **(Kotaki Col. 1 line 68 – Col. 2 line 6)**; a contour detection step of detecting a contour using the feature values binarized by the binarization step **(Kotaki Col. 2 lines 11 – 19)**. However, **Kotaki fails to teach** an image signal value correction step of correcting an image signal value of the pixel of interest using image signal values of a plurality of pixels including the pixel of interest in a same direction as the contour detected by the contour detection step. **Pertaining to the same field of endeavor, Adams teaches a deinterlacer system that detects the presence and orientation of edges and calculates image pixel values based on the detected edges. Specifically, Adams teaches carries out interpolation from source image pixels located along the detected edge orientation (Adams Col. 3 lines 4 – 7). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the edge detection result of Kotaki to carryout interpolation of the pixel of interest based on the pixels along the detected edge, as taught by Adams, in order to avoid jagged or objectionable looking artifacts (Adams Col. 1 56 – 59).**

b. Regarding claim 6, Kotaki as modified by Adams with regard to the independent claim 5 further teach that the image signal value correction step corrects the image signal value of the pixel of interest by carrying out weighted addition of the image signal values of the plurality of pixels in the same direction as the contour **(Adams Col. 16 lines 10 – 12 and lines 27 – 28 – See Fig. 9A)**.

c. Regarding claim 7, Kotaki teaches the image processing method according to claim 5, wherein the contour detection step detects the contour by carrying out pattern matching of distribution of the feature values in the specified region binarized by the binarization step with preset binary distribution **(Kotaki Col. 2 lines 11 – 14)**.

9. Claims 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kotaki et al. (U.S. Patent No. 5,200,841) in view of Adams (U.S. Patent No. 7,023,487) and Cho (U.S. Patent No. 7,142,239). Hereinafter referred to as Kotaki, Adams and Cho respectively.

a. Regarding claim 8, Kotaki teaches an image processing method comprising: a feature value calculation step of calculating feature values of micro regions in a specified region having a pixel of interest at a center, from pickup results of an image pickup device that has a color filter with a particular color at each of pixels arrayed two-dimensionally **(Kotaki Col. 1 lines 59 – 65 and Col. 11 lines 9 - 10)**; a binarization step of binarizing the feature values of the micro regions calculated by the feature value calculation step **(Kotaki Col. 1 line 68 – Col. 2 line 6)**; a contour detection step of detecting a contour using the feature values binarized by the binarization step **(Kotaki Col. 2 lines 11 – 19)**. However, **Kotaki fails to teach** an image signal value correction step of correcting an image signal value of the pixel of interest using image signal values of a plurality of pixels including the pixel of interest in a same direction as the

contour detected by the contour detection step. **Pertaining to the same field of endeavor, Adams teaches a deinterlacer system that detects the presence and orientation of edges and calculates image pixel values based on the detected edges. Specifically, Adams teaches carries out interpolation from source image pixels located along the detected edge orientation (Adams Col. 3 lines 4 – 7). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the edge detection result of Kotaki to carryout interpolation of the pixel of interest based on the pixels along the detected edge, as taught by Adams, in order to avoid jagged or objectionable looking artifacts (Adams Col. 1 56 – 59).** Although Kotaki suggests that when no edges are detected, the results of other circuits can be used **(Kotaki Col. 8 lines 14 – 16)**. However, **Kotaki further fails to teach** an edge intensity value calculation step of calculating, when the contour is not detected by the contour detection step, an edge intensity value in a neighborhood of the pixel of interest from the feature values of the micro regions calculated by the feature value calculation step; a filter value calculation step of calculating a low-pass filter value of the pixel of interest from the image signal values of neighboring pixels which have a same color component as the pixel of interest; and a second image signal value correction step of correcting the image signal value of the pixel of interest by using the edge intensity value calculated by the edge intensity value calculation step and the low-pass filter value calculated by the filter value calculation step. **Pertaining to the same field of endeavor,**

Cho teaches an edge intensity value calculation step of calculating an edge intensity value in a neighborhood of the pixel of interest from the feature values of the micro regions calculated by the feature value calculation step **(Col. 17 lines 48 – 51 and line 59 to Col. 18 line 5) [Note the example of the calculation of at least the first directional coefficient for G components given in Col. 18 lines 34 – 60]**; a filter value calculation step of calculating a low-pass filter value of the pixel of interest from the image signal values of neighboring pixels which have a same color component as the pixel of interest **(Col. 15 line 59 – 64) [Note Fig. 6 blocks 611 - 621; which effectively use the G components of neighboring pixels in Fig. 1 to obtain a low-pass signal]**; and an image signal value correction step of correcting the image signal value of the pixel of interest by using the edge intensity value calculated by the edge intensity value calculation step and the low-pass filter value calculated by the filter value calculation step **(Col. 23 lines 47 – 60) [Note that this is essentially implemented in Fig. 6, in which the values of the directional coefficients corresponding to the edge amount and direction are used to select the low passed values. As Cho explains, equations 1 and 2 form the mathematical basis for adaptively applying the low passing based on the detected edge degree.]** **Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to feed the output of Kotaki's multi-value image windowing step (Kotaki Fig. 1 element 3) to Cho's edge directional coefficient calculation step in order to enhance image sections**

containing edges or features too weak or gradual to be detected by Kotaki's binarization.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Kubota (U.S. Patent No. 7,149,355) teaches an edge enhancement system in which the edge direction is determined by comparing to patterns, and the pixels are enhanced and enlarged using the edge shape.

b. Park et al. (U.S. Patent No. 6,148,116) teaches a contour enhancement system including contour detection and a coring processing controlled by the output of a median filter around the pixel of interest.

c. Maenaka et al. (U.S. Patent No. 7,039,254) teaches carrying out edge detection and correction during a spatial interpolation step.

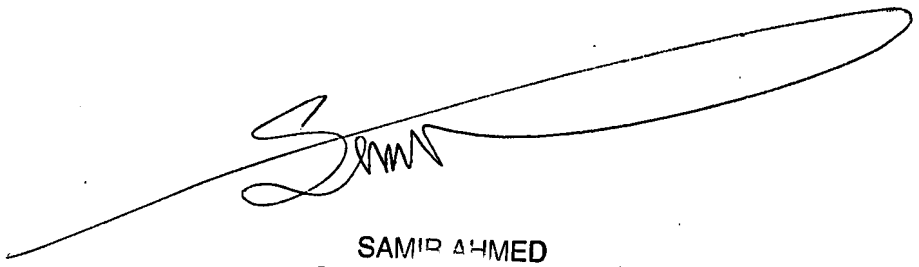
d. Nagao et al. (U.S. Patent No. 5,491,759) teaches a document edge detection system using binarization.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael A. Newman whose telephone number is (571) 270-3016. The examiner can normally be reached on Mon - Thurs from 9:30am to 6:30pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir A. Ahmed can be reached on (571)272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

M.A.N.



SAMIR AHMED
PRIMARY EXAMINER